Space Weather Forecast

Issued on Thursday, 19 May 2022 at 13:17 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Radio Blackouts from Moderate-class X-ray flares likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has remained moderate over the past 24 hours, with a trio of moderate-class flares observed in the period. The largest of these was from the vicinity of a rapidly-developing sunspot group in the northeastern quadrant at 19/0719UTC. This was flanked in time by two smaller moderate-class flares from the hitherto most active group, a large feature that dominates the facing side of the sun near the solar meridian in the northern hemisphere. All the above came on a solidly and slightly intensifying common-class X-ray background, with frequent more minor flares observed, mainly from the aforementioned regions.

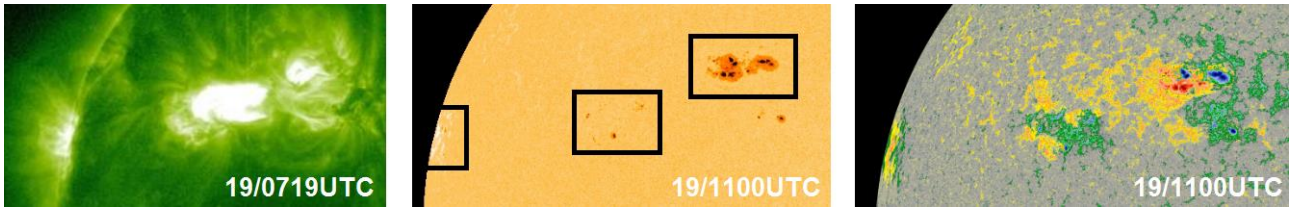

Figure 1: Left to right: false-colour extreme UV satellite image of the peak X-ray flare in the period; visible image of the sunspot regions responsible for the period's larger flares; the same portion of the sun viewed in terms of magnetic polarity – note the heavily contorted nature of the rightmost region, hitherto the most active but recently usurped by a growth spurt from its immediate eastern neighbour.

There are now up to nine sunspot regions on the Earth-facing side of the sun. It is not yet clear whether there may be a transfer of power in terms of most active group in this forecast period, with the largest X-ray flare coming to the east of the largest spot and not the group itself, perhaps indicating some shift in the underlying 'hot spot'. The southern and western portions of the area responsible for the biggest flare saw a rapid growth trend in the past 24 hours, but with this trend stalling late in the period.

Other regions on the sun were less notable, with a stable or decaying trend evident for the most part - to the extent that one faded entirely. In the far northeast, there are suggestions of a new sunspot group arriving over the horizon, possibly the third most active region on the sun at present, but with no moderate-class flares observed, and with the narrow viewing angle hampering analysis.

Despite the large flares in the period and a possible minor 'filament lift-off' (arc of plasma leaving the sun to potentially form a Coronal Mass Ejection (CME)), no Earth-directed Coronal Mass Ejections (CMEs) have been observed in the last 24 hours.

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Solar Wind / Geomagnetic Activity: The solar wind was perhaps indicative of vestigial influence from a waning coronal hole fast wind, although most measures stabilised in the period, with a slightly elevated solar wind speed and near-normal numbers of particles and associated magnitude of magnetic field.

The net result of the above solar wind measures was mainly quiet geomagnetic indices, well below minor storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed in the period, despite the trio of large X-ray flares.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be moderate, with a slight chance of an isolated strong-class flare (R3 Radio Blackout).The main source of activity is expected to be the northeast quadrant of the sun in general, and up to three regions in this general area.

Solar Wind / Geomagnetic Activity: A weak CME was observed from a sunspot at 17/0510UTC. This has been assessed as most likely passing behind Earth's orbit on 20 May, but may give a glancing blow but with very low confidence.

Slightly elevated to elevated solar winds are expected to persist through much of the period, as further coronal hole influence is anticipated.

Geomagnetic activity is forecast to increase a little in the four days, with a slight chance of a G1/Minor Storm interval, due to the fast wind arrival, most likely on day 1 (Thursday 19 May). Conditions should very gradually revert to become more reliably quiet later in the UTC weekend.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with a daily slight chance of events surpassing S1, should any notable proton-producing X-ray flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	15	10	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	75	75	75	75
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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